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Optimization of nanoparticle transport using monolayer and multilayer cell models

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High atomic number nanomaterials have been explored as a tool for improving cancer therapeutics. Gold nanoparticles are a system that has been introduced as they can act as effective radiation dose enhancers and anticancer drug carries. Gold nanoparticles have unique physiochemical properties that allow them to be probed in cells using techniques such as scanning electron microscopy and hyper spectral imaging. Optimization of gold nanoparticle uptake into 3D in-vitro models is essential to optimizing future cancer therapeutic applications and bridging the gap between in-vitro and in-vivo tumour environments. The optimization of the uptake of functionalized gold nanoparticles into 2D monolayer and 3D spheroid cell models was tested. Our initial findings reveal that smaller gold nanoparticles penetrate better vs larger gold nanoparticles within the 3D tumor models. This correlates very well with our recent in-vivo data. Hence, development of these 3D tissue models can be utilized to mimic tumor microenvironments in the lab, which would accelerate the use of gold nanoparticles in future cancer treatment.

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